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Framework to Development of Disaster Mitigation Model in Mountain Tourism Destination

Jalu Rafli Ismail
Geography Education Study Program, Universitas Pendidikan Indonesia, Bandung, Indonesia.

Wanjat Kastolani
Geography Education Study Program, Universitas Pendidikan Indonesia, Bandung, Indonesia.

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Abstrak: The geographic position of Indonesia provides both disaster threat and natural resources potential. Indonesia is an archipelagic country located between three major tectonic plates, namely Indo-Australia; Pacific; and Eurasia. Consequently, numerous of active volcanoes and faults are spread across the islands. Indonesia's unique landforms are often utilized as a unique tourism spot. Along the mountain ranges of Bogor and Cianjur, Bandung, and Garut to Tasikmalaya, various volcanic tourism spots exist side-by-side with the threat of volcanic eruption, mass movements, and earthquake. Therefore, disaster mitigation had to be properly planned to guarantee the sustainability of businesses and investments, as well as for tourists' safety. This research aims to develop the mitigation model for mountain tourism destinations in West Java Province. Three of currently developing mountain tourism spots are Gede-Pangrango Mountain, Tangkuban Parahu Mountain, and Guntur Mountain. Design of this research is R&D through the 4-D model, consists of Define, Design, Develop, and Disseminate. Disaster mitigation model planning involves research subjects consisting of tourism destination management and local communities. Research instruments used include interviews and observations. The data obtained consists of information regarding disaster perceptions and severity measurements through observations. The developed mitigation model is subsequently validated by experts and research subjects to assess its suitability. The output of the development is a "Conceptual Model", which is a participative mitigation strategy between tourism destination management and local communities. This conceptual mitigation model can be utilized by policymakers as a foundation for monitoring the spread of tourist destinations in facing natural disaster threats.

Kata Kunci: Disaster Mitigation; Management Model; Mountain Tourism; Sustainability .

Introduction

Geographic significance of Indonesia presents various potential resources. One of them is tourism. Numbers of seas, beaches, rivers, mountains, valleys, highlands, forests, and agricultural lands are worth economically as the tourism destination all across Sabang to Merauke (Surya et al., 2020). As a country crossed by the Ring of Fire, threat to geologic disaster is exists alongside these wonders. The intersection of Circum-Pacific and Alpine-Himalayan belt in Indonesian regions is the factor of volcanic eruption vulnerability (Kastolani & Mainaki, 2018 ; Shen et al., 2018). Situated in a tropical climate, Indonesia faces

two seasonal changes with the exposure to the sunlight throughout the years. As mentioned in Wandala et al. (2018), geomorphological processes driven by this factor caused the threat of geo-hydrometeorological disaster, such as earthquake, mass movement, flood, tornado, and drought.

The province of West Java is similarly facing these geo-hydrometeorology threats in its tourism sectors. According to Van Bemmelen (1949), geomorphology of West Java is distinguished into four zones, namely Jakarta Zone, Bogor Zone, Bandung Zone, and Souther Mountainous Zone. With Jakarta Zone as the only alluvial landform adjacent to the Java Sea, three other zones are characterized by its mountain and hill features (Tambunan, 2017). Natural resources in this province have been utilized as attractive destination located in highlands, mountainous regions, rivers, lakes, and beaches. Out of these physical features, tourism activities that are developed are hiking, camping, and outbound, as well as leisure activities in hot spring water, craler lakes, the evergreen tea plantation, and mild climate (Erfurt, 2018). Tourism potential in West Java covers its unique cultural, economic, and culinary aspects.

Based on its typology, seven volcanoes in West Java are categorized as type-A that has the eruption history since 1600 (Zaennudin, 2010). These eruption-potential volcanoes are Salak, Gede, Tangkuban Parahu, Ciremai, Guntur, Papandayan, and Galunngung (Agustin & Bronto, 2019). Consequently, areas surrounding these volcanoes are as well vulnerable to the disaster threat. According to the National Agency for Disaster Countermeasure (BNPB, 2016), landslide and flood are the most potential disaster in the province. Administrative regions where flood is frequent are Bandung Regency, Indramayu, Subang, Karawang, Cirebon, and Bekasi. Meanwhile landslide occurs quite often in Garut Regency, Bandung Regency, Cianjur, Sukabumi, Tasikmalaya, Majalengka, Kuningan, and Bogor. With these disaster vulnerabilities, mitigation that seeks to minimize disaster effects is necessary. Particularly to tourism sectors, disaster mitigation needs to be carefully planned to sustain the huge investment and local businesses.

Disaster mitigation is part of disaster management. Framework of disaster management consist of three components, namely information, participation, and planning (Oh & Lee, 2020). Thus, the success of mitigation is not only depended on the analysis, preferences of mitigation strategies, plan of actions, and controls. Communication strategy is equally crucial to avoid misinformation and disorganization in the time of crisis (Anshori et al, 2022). Certain tourism destination is now dedicating a special division on disaster management. The task needs to be carried by business sector is to coordinate management structures and local community. Values from locals can also be applied as a technique or method of mitigation. Traditions found in rites and ceremonies in mitigating disaster can be supported by technologies to increase its effectiveness (Appleby-Arnold et al., 2018). Absorbing local values under the collaboration scheme is directed to lessen two parties' resistance and strengthen synergy. This framework of management is implemented to enhance knowledge, awareness, and preparedness of tourism destination in facing disaster threats.

Tourism is an industrial sector prone to various disaster threat (Rindrasih et al. 2019). The importance of tourism lies in its multi-sectoral role within the development. Attention to risk management of tourism sectors is necessary, due to its involvement in a broad tourist network both local and international. Three targets in this risk management model consists of: a) human as tourist; b) local community as the empowered subjects; and c) public and private managements of tourism sectors (Abdillah et al, 2015). An example where natural disaster affects seriously on the tourism sector, as indicated in Nugroho & Parsudi (2018) is Kelud volcanic eruption in February 2014, where multiple hotels, restaurants, travel services, tour guides, and attraction spots in East Java were collapsed. As mentioned in Rindrasih (2014), the loss of these businesses reached two million rupiah a day, for hotel and

restaurants. Furthermore, this also includes the inestimable loss of opportunity cost due to cancellation of national tourists.

The development of mountainous natural tourism areas in West Java has experienced significant growth. Even in volcanic mountain groups, tourist destinations are still developed by offering unique environmental conditions (Pamungkas & Jones, 2021). There are as many as 437 natural tourist locations in West Java Province. In other words, 28% of the tourism attractions across districts and cities in West Java Province are natural tourist spots (Disparbud, 2023). This figure does not yet encompass various cultural destinations and interest-based tourism that have emerged as a result of the development of natural tourism areas. As argued by Kusnadi et al. (2024) and Wulung & Brahmantyo (2018), mountains have become attractive areas for tourist destinations due to their natural beauty and resources that visitors can utilize, including hot springs for recreation and therapy, mountain springs as drinking water sources, as well as slopes and peaks for camping activities.

Similar to environmental damage caused by disaster threats, mountainous tourist areas in West Java also face potential disruptions. Tourist areas such as Mount Tangkuban Parahu, Gede Pangrango, and Guntur maintain a risk of eruption despite their relatively low eruption intensities (Tennant et al., 2021; Fitriani et al., 2021; Jenkins et al., 2022). The presence of threats in these destinations is evidenced by the socialization activities and readiness training for local communities (Yuliani et al., 2018). To qualify as safe and sustainable tourist destinations, mountain tourism management must have an understanding of disaster threats in their regions. This can be achieved through the development of mitigation models that serve as action frameworks to minimize impacts and address damages caused by natural disasters.

Marketing strategy in tourism business needs to consider disaster mitigation. Tourist safety and convenience affect positively to destination image (Marine-Roig & Huertas, 2020). Revisit intention to certain destination occurred when good impression is created. The existence of disaster threat positioned tourism sector as both vulnerable and resilient, depending on its preparedness. Implementation of disaster mitigation in tourism destination needs to be furtherly observed. This research aims to develop a model that can be applied in different mountain tourism destination. Three research objectives emerged upon the study are as follow:

a. Identification of disaster threats in mountain tourism destination in West Java Province.
b. Analysis of means of disaster mitigation in mountain tourism destination in West Java Province.
c. Development of disaster mitigation model for mountain tourism destination in West Java Province.

Methods

This research implements Research and Development (R&D) method. The aim of implementing R&D research is to innovate and introduce concepts or actual products. Gay (1992) set a limitation that this type of research focused on the development process and not to test a theory. Meanwhile, Plomp & Nieveen (2013) added that R&D researches provides "added value" on the existing situation. Under this method, the 4D model is implemented. This model was developed by Thiagarajan, Semmel, and Semmel (1974). Steps in the 4D or Four D model are: Define, Design, Develop, and Disseminate. Flow of research process is indicated in the Figure 1 below.

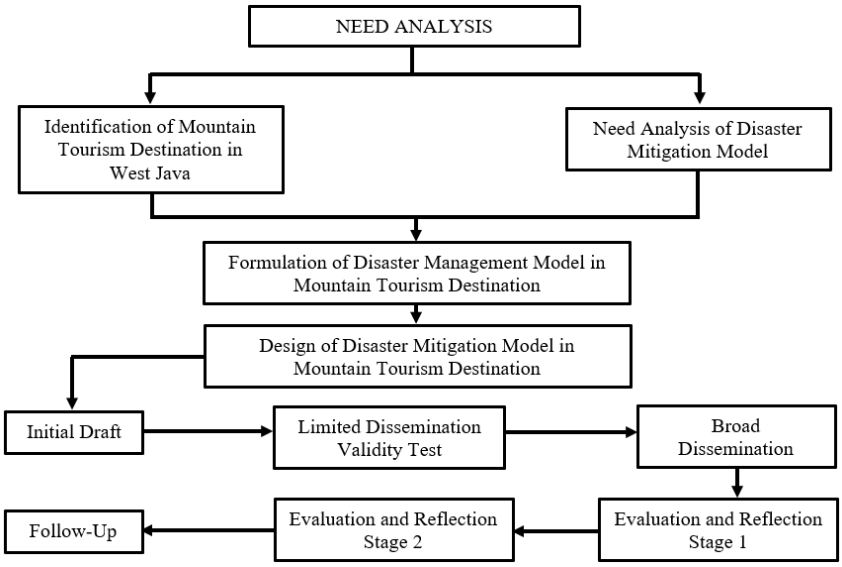

Figure 1. Design of Disaster Mitigation Development for Mountain Tourism Destination

Two types of data that is developed in this research is the instrument of interview and observation. The aim of this collection technique is to gather information in the perspective of research subjects, viewed from their opinion, behavior, perception, or experiences. Observation technique help researchers to validify information given by research subjects or respondents. Collection and analysis of data is predetermined by the 4D steps of define, design, and develop and is carried in the dissemination process. Outline of this research process is as follow:

a. Define, involve the analysis on the situation and condition of the mountain tourism destination, and existing mitigation program in the destination. Through this information, problems on current mitigation strategy can be identified.
b. Design, aims to plan and formulate disaster management model and all of the requited infrastructure. This step includes planning process on the mitigation model design, that consist of: identifying components of disaster mitigation model, formulating objectives, determine the sequence of plans, and small-scale evaluation.
c. Develop, produce a mitigation model and samples of required infrastructure/tools that will be used. In the development process, the following steps are carried:
    1. Development of initial product, such as materials of model, guidebook, and evaluation tools
    2. First stage field test in three location of mountain tourism destination. Data collection through interview, observation, and questionnaire is initiated in this step.
    3. Product revision based on recommendation from the previous step. Discussion with experts of disaster management is involved.
    4. Main field test to gather quantitative data, that is required prior and after to the testing.
    5. Revision of incomplete (half-done) product based on the previous step.
    6. Second stage field test, recollection of data through interview, observation, and questionnaire inputs for analysis.
    7. Revision of complete product based on the recommendation from the last field test..

Result and Discussion

Most of natural disasters occur unpredictably. Without proper mitigation planning, losses in form of human life, properties, and opportunities are huge. Direct and indirect effect from natural disaster disturbs social and economic aspect. Disaster mitigation model developed through this research is to be implemented in mountain tourism destinations in West Java province. Two major natural disasters that pose biggest threat are volcanic eruption and landslide or mass movement.

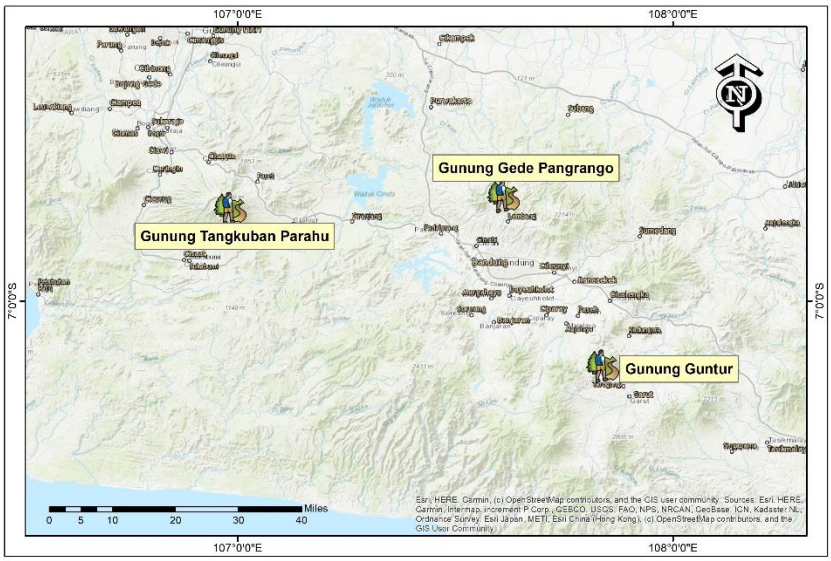

Figure 2. Study Area of Mountain Tourism Destination in West Java

Mountain Tourism Destinations in West Java Province

West Java Province has a varied topographic profile, from 3 meters above sea level to 3078 meters above sea level. The dominant landform in West Java is characterized by its mountainous surface. Therefore, tourism spots are mostly developed in the highland (Wahana et al., 2021). These destinations are agglomerated in Bogor and Cianjur, Bandung, and Garut to Tasikmalaya. Three examples of mountain tourism spot in West Java studied in this research are Gede Pangrango Mountain, Tangkuban Parahu Mountain, and Guntur Mountain. Each of these spots has their own unique characteristic. Attractions can be found in Gede Pangrango are its lake, waterfall, and hot spring water (Natalia & Herdianita, 2018). Tangkuban Parahu is prime destination for tourists from urban areas (Panday, 2021). Mild climate from ericaceus and dipterocarp montane forests are the attraction for tourists coming from low-elevated areas. Meanwhile, Guntur Mountain is known for the existence of Cipanas hot spring water that significantly contribute to the regional income (Basuki et al., 2019).

1. *Tourism Destination around Gede Pangrango Mountain*

Gede Pangrango Mountain National Park is located in West Java Province. Dedicated in 1980, this national park is one of the oldest in Indonesia. Gede Pangrango National Park has the function of conserving and protecting unique and exotic mountain ecosystem. Total area of this national park is 22,851 hectares covering Gede Mountain (2958 m asl) and Pangrango Mountain (3019 m asl), and surrounded by mountain forests. The two summits are connected by the ridge with the elevation of 2400 meters above sea level known as Kandang Badak. Compared to Gede that has lower elevation, Pangrango has a smoother

summit. In this national park, there are four craters formed from active Gede volcano, namely Ratu crater, Wadon crater, Lanang creater, and Baru crater.

Huge potentials in this national park have attracted large number of tourists. As indicated in Susanto et al. (2021), there are 251.222 tourists visited the Gede Pangrango Mountain National Park, both national and international tourists. Based on the statistics of governmental management called Balai Besar Taman Nasional Gunung Gede Pangrango (2013), purposes of visiting the national park are for recreation, hiking, research, edu-tourism, and camping. Numerous tourism spots are found within the national park, as mentioned below:

a. Telaga Biru, a small lake that has the total area of 1575 hectares, located 1,5 kilometers from the Cibodas entrance. This lake has the blue color due to the concentration of blue algae.
b. Cibeureum waterfall, with the height of 50 meters located 2,8 km from Cibodas. The endemic red moss is found around the waterfall.
c. Hot spring water found within 5,3 kilometers around Cibodas.
d. Kandang Batu and Kandang Badak, two destinations used for camping and flora-fauna observation. Situated in the elevation of 2220 meters above sea level with the distance of 7,8 kilometers from Cibodas.
e. Gede Mountain summit and craters. Tourim attractions from this area is the scenery of sunset and sunrise, the view of Cianjur -Sukabumi – Bogor from above, attractive geologic features, and endemic flora around the crater. The distance of this area from Cibodas is 9,7 kilometers.
f. The Alun-alun "plaza" Suryakencana with the total area of 50 hectares and covered by edelweiss flowers. The plaza is situated in 2750 meters above sea level and the distance of 11,8 kilometers from Cibodas.

Tourism destination that is also found near the national park area is Cibodas Botanical Garden, located in Cimacan Village, Cipanas Sub-District, Cianjur Regency. Situated right in the foothills of Gede Pangrango and the elevation of 1275 meters above sea level, the average temperature of this area is 17 to 27 degree-Celsius. This botanical garden has the collection of 5831 plant species, with 1206 is endemic types. attractions mostly visited are green house that exhibits 4000 plants species, with 350 of them are cactus and 360 orchid species, Araucaria Avenue, Cibodas waterfall, Sakura trees, fountain, and lakes.

2. *Tourism Destinations around Tangkuban Parahu Mountain*

The natural park of Tangkuban Parahu is located in Lembang sub-district, West Bandung Regency, West Java Province. This destination is 20 km from Bandung City. Tangkuban Parahu natural park is situated in the elevation of 2084 meter above sea level and its mountain categorized as stratovolcano. This active volcano has the unique eruption directing from the east toward its west side. Number of craters found in this area, namely the craters of Ratu, Upas, Domas, Baru, Jurig, Badag, Jurian, Siluman, and Pangguyungan Badak. Other tourism spots with the volcanic and highland characteristic are also found here. Those are Sari Ater, Cikole-Jayagiri Resort, Maribaya waterfall, Grafika Cikole outbound, De Ranch, Floating Market, and many others that are under constructions.

Physically, Tangkuban Parahu is an active volcano with the last eruption in 2019. The average temperature in the area is 17 degree-Celsius in the day and 2 degree-Celsius in the night. Most of this tourism area is covered by dipterocarp montane and ericaceus forests presenting fresh and beautiful scenery. The natural resources abundant in this area is sulfur potential for the development of hot springs and managed as tourism spot. Tangkuban Parahu is managed by private enterprise Graha Rani Putra Persada. One of factor that support the sustainability of this destination is the adequate facilities for accommodation, variability of businesses, and accessible for transportations directing from different locations.

3. *Tourism Destinations around Guntur Mountain*

In Garut Regency, Guntur Mountain is the source of different tourist attractions and destinations. Guntur Mountain is situated in 2249 meters above sea level. In the north, borders with Leles highland, borders with Garut highland in the eastern and souther part, and with the mountain of Kunci, Sanggar, and Rakutak, as well as Kamojang crater, in the west. Its moderate surface is mostly used as settlement areas found in Garut, Kadungora, Leles, and Cipanas. Meanwhile the steep area situated near to the summit of Guntur Mountain is covered by forests. Geologically, the surface of Guntur Mountain is built by explosive and effusive lava flow forming the horseshoe morphology. Guntur Mountain is still an active volcano where hot spring waters came from. The temperate of sulfur water reaches 49 degree-Celsius. For the visitors, the existence of sulfur water has health significances.

One of the most visited tourism destinations around Guntur Mountain is the Cipanas hot spring. The name itself came from local term for water – "ci", and hot – "panas". Cipanas tourism destination is now covering the total area of more than 500 hectares, and three villages, namely Pananjung, Rawabango, and Langensari. This hot spring area is built in the form of soaking pool, swimming pool, and waterboom (since 2002). The local government owned the Cipanas Indah (CI) hotel. Other favorable destinations nearby are Danau Dariza resort-hotel which connects each space with water and boat, and Sabda Alam waterpark with waterboom inside. All of these attractions contribute significantly to the regional income from taxes and retributions.

Identification of Disaster Threats around Gede Pangrango, Tangkuban Parahu, and Guntur Mountain Tourism Destination

1. *Volcanic Eruption*

Disaster mitigation to the volcanic eruption consists of periodical monitoring on volcanic activity. The reference that can be used on the eruptiom mitigation effort is Kawasan Rawan Bencana (KRB) map or disaster vulnerable areas map. This map is published by the Center for Volcanology and Geological Hazard Mitigation or Pusat Vulkanologi dan Mitigasi Bencana Geologi (PVMBG). This research identified the vulnerable areas in the mountains of Gede Pangrango, Tangkuban Parahu, and Guntur. Each volcanoes had three vulnerable zones, namely KRB III, KRB II, and KRB I.

a. Gede Pangrango Mountain
    1. KRB III covers the central crater of Gede and Gumuruh caldera in the southeast part. This zone has the vulnerability as follow:
        - Material fllow hot cloud and surge, lava flow.
        - Volcanic projectile: heavy pyroclastic fall, incandescent materials, and poisonous gases.
    2. KRB II have the vulnerability of:
        - Material flow of hot cloud, lava, poisonous gases, and possible volcanic debris.
        - Pyroclastic fall, incandescent material, and heavy volcanic ash rain.
    3. KRB I have the vulnerability of:
        - Material flow of lava.
        - Fine grained pyroclastic fall and volcanic stones projectile.
b. Tangkuban Parahu Mountain
    1. KRB III in this area cannot be used as human settlement or other commercial means, due to its close proximity to the eruption center. This area is vulnerable of material fall and ash rain of the phreatic eruption in radius 0,5 – 1 km.
    2. KRB II have the vulnerability of:

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- Exposure to hot cloud.
- Lava flow
- Heavy volcanic ash rain and volcanic stones projectile.

3. KRB I in this area have the vulnerability of lava flow. During the eruption period, volcanic projectile, such as ash rain and pyroclastic fall, are potential. This zone situated in the radius 5 km and more from the eruption center.

c. Guntur Mountain

1. KRB III covers the area of Guntur crater to Masigit mountain in the northwest and and southeast part. No settlement is found in this area. This zone is vulnerable of
   - Material flow in the form of hot cloud, lava flow, and fall.
   - Volcanic projectile of lapilli and bomb/block with the size >64 mm and heavy ash rainfall.
2. KRB II consists of two vulnerability area: a) vulnerability area from material flow of 35,48 km2, and b) vulnerability area from volcanic projectile of 50,24 km2.
   - Material flow: hot cloud, lava flow, and volcanic material landslide.
   - Volcanic projectile with the size of gravel and lapilli and the maximum diameter of 64 mm, as well as heavy ash rain.
3. KRB I potential of lava flow and ruins of volcanic ash rain. This area has the low likelihood of exposed to hot cloud, volcanic projectiles, and lava ruins with the maximum size of 10 mm. This area located in the radius of 5-8 km from eruption center and the total area of 122,46 km2.

2. *Landslide Disaster*

West Java is the province where landslide is often occurred compared to other provinces in Indonesia. This is related to its geologic position, rainfall, human activities, and surface slope. Therefore, mountain tourism destinations is prone to the landslide disaster. All of the studied area, the mountains of Gede Pangrango, Tangkuban Parahu, and Guntur are all vulnerable to this disaster. The unique morphology of West Java is quarter volcano and ridge in the central depression zone. According to Bemmelen (1949), the mountains of Gede Pangrango and Tangkuban Parahu is part of quarter volcano range located between Bandung and Bogor Zone. Meanwhile, Guntur Mountain is situated in the Garut depression zone, which is still part of Bandung Zone.

The Bandung zone is formed by depression between mountains. There are two physiographic profiles of this zone, namely ridge of central depression zone, and West Java central depression zone. Mountain that birders these depressions is commonly an elevation stacked up of tertiary-aged rocks. Based on the structure, this zone is the peak of Java antcline. The border of Bandung Zone and Bogor Zone is the quartenery mountain ranges, such as the mountains of Pangrango, Salak, and Tangkuban Parahu. The southern mountain zone is separated by volcanic ranges, namely Patuha, Malabar, Papandayan, and Tilu. This zone spanned from Pelabuhan Ratu to Nusa Kambangan in Cilacap. Generally, the southern mountain zone exposed the southern slope of Java anticline. There are three physiographic profiles of this zone, namely Jampang, Pangalengan, and Karangnunggal.

Landslide will likely occur when the driving force on the ground surface is bigger than the resisting force. Factors affecting resistance of the slope are rock strength and soil compaction. Driving force of landslide is then determined by the size of slope angle, water, as well as burden and specific gravity of rock and soil. Triggers to the occurrence of landslide is rainfall, earthquake, and human activities. Land use utilization by human is currently the most significant factor. Deforestation, planting of large trees with the short distance between them, non-environmentally friendly mining, and the cutting of cliff and slope for road construction could be a strongest trigger to landslide. Thus, monitoring on the land use and

man-made landscape is necessary as a way of mitigating landslide in the mountain tourism destinations.

Development of Disaster Mitigation Model in The Mountain Tourism Destinations

Disaster mitigation to the mountain tourism destinations is based on two conditions. Firstly, when the mountain indicates an increased volcanic activity. Secondly, the dynamic of mountains topographic condition. The study area of Gede Pangrango, Tangkuban Parahu, and Guntur are all categorized as an active volcano. Mitigation is an effort to minimize risks when disaster occurs, both from physical development or raising awareness and knowledge of local communities (Kastolani, 2016). The extent of the study area is delimited to the management of tourism destination. Therefore, the rights and responsibility in any mitigation efforts determined by the management parties. Local communities, as also the affected ones, have an equal role to control their own environment and mitigate effects from potential disaster.

Prior to developing a model to be implemented in the tourism destination, data collection should be carried. Two types of instruments were used as a technique, namely interview and observation. The subjects of research are managements of the tourism destination and local communities. This instrument act as the parameter to determine the preparedness of both management and local communities to the potential disaster. The table 1 below presented an interview instrument for the destination management. Questionings include the topic on the organizational efforts to disaster mitigation.

Table 1. Interview Instrument Guidelines

1	What disasters are potential to the tourism destination? Answer:	
2	When was the last time that disaster occurred? Answer:	
3	Type of last occurred disaster? Answer:	
4	Victims/loss	
	Death tolls	
	Income/property loss	
5	Is there a specific division of disaster mitigation in the tourism destination?	
	Yes	No
6	How is the organizational settings and task distribution in the management?	
7	How many manpower involved in mitigation effort? Answer:	
8	What is the existing mitigation program directed by the management? Answer:	
9	How is the collaboration between governmental organizations? Answer:	
10	In what extent does the management socialize the disaster threats to visitors? Answer:	

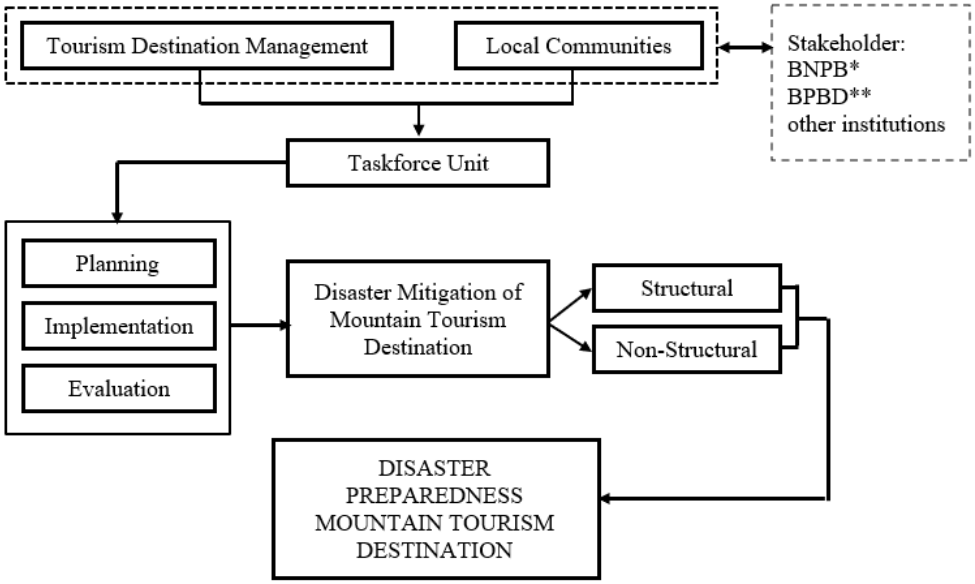
Form of disaster mitigation can be both structural and non-structural. Tourism destination management or organizer play a crucial role and hold a right to initiate this. For the structural mitigation, the management ensured that facilities built within the area are adjusting to the KRB limitation, and materials of construction are not triggering potential disaster threats. Codes/direction within a tourism are that will be necessary during the evacuation is also crucial, as it is with the assembly point, evacuation route, and retaining wall. Meanwhile the non-structural mitigation is initiated in form of training or simulation of disaster. The aims of synergizing both structural and non-structural mitigation is to

strengthen the preparedness of management and local communities upon facing potential disaster threat.

Table 2. Observation Instrument Guidelines

No	Variables				
Physical Landscape Observation					
	Geology/lithology				
	Soil Type				
	Topography	○ mountainous	○ hills	○ plains	
	Slope	○ steep	○ convex	○ concave	○ gentle
	Vegetation	○ tight	○ sparse	○ none	
	Vegetation type				
	Erosion type	○ splash	○ sheet	○ riil	○ gully
	Rainfall	○ high	○ moderate	○ low	
	Disaster threat	○ earthquake	○ landslide	○ flood	
Capacity Observation					
	Vegetation	○ adequate	○ moderate	○ lacking	
	Pollution sources	Domestic (…….%)	Hotel (…….%)	Tourists (…….%)	Others (…….%)
	Locational map	○ moderate	○ lacking	○ none	
	Evacuation route	○ available	○ unavailable		
	Health facilities	○ available	○ unavailable		

Formulation of disaster mitigation model complied with the existing situation. Observation of existing infrastructure matched with the physical condition had to be carried to determine the level of danger and preparedness in the tourism destination (Table 2). Mitigation model that is suitable to the condition of Gede Pangrango, Tangkuban Parahu, and Guntur mountains is the conceptual model. This model collaborates the role and function of tourism destination management and local communities. Effect of potential disaster can be a threat for the two parties. Therefore, positive exchanges between the two is the main capital on the implementation of this conceptual model (Fig. 2). Not limited to the disaster mitigation planning, this two-party collaboration could be expanded to economic advantages, such as the opportunity for local communities to create small businesses, porter services, outdoor tools rent, or parking spaces.



*BNPB: National Agency for Disaster Countermeasure
*BPBD: Regional Agency for Disaster Countermeasure

Figure 3. Conceptual Disaster Management Model

This model mixed the concept of disaster management initiated by the government and the disaster preparedness villages in the Special Region of Yogyakarta (Ruslanjari et al., 2020). The aim of developing a disaster preparedness area is to build the sense of belonging between tourism destination management and local communities. While the management or division of disaster mitigation represents the tourism destination side, local communities are represented by village-level authorities or community organizations. This model of coordination aimed for a clearer task distribution and functional implementation. Local organizations are in compliance with participation pillars as follow: 1) local community social worker; 2) youth organizations; 3) non-governmental organization; and 4) disaster preparedness organization. Numbers of village in Indonesia have successfully implemented the concept of disaster preparedness village, two of them are in the province of Yogyakarta and West Sumatera. The Kampung Siaga Bencana is initiated by the government based on the minister decree. However, the essential concept is to place local community aspiration in effort of disaster mitigation.

The conceptual model also emphasized a participative collaboration between management of tourism destination and governmental organization. In the regional level, the BPBD or Regional Agency for Disaster Countermeasures have the rights and function to both socialize the disaster mitigation initiatives and provide necessary tools or infrastructure in that effort. Three components of mitigation emphasized by BNPB and BPBD are preparedness prior to disaster occurrence, evacuation during the disaster occurrence, and rehabilitation after the disaster. Conceptual disaster management model seeks to empower all involved components in raising knowledge, awareness, and preparedness to threats of disaster. Sustainability of tourism destination and every social-economic opportunity within it is the aim of this model implementation.

Conclusion

Geologically, the province of West Java is mostly situated by the three zone, namely the Bogor Zone, Bandung Zone, and Southern Mountain Zone. The dominant landform in these zones is mountains and high lands. Therefore, the disaster threat are landslide and flood. As this area also crossed by volcanic range, potential of volcanic eruption and earthquake is also existing. The landform of West Java provides both abundant natural resources and threat to disaster. In order to sustain activities that utilize those resources, such as tourism, proper mitigation effort needs to be initiated. In the three major mountain tourism destination, the conceptual mitigation model is considered suitable. The main idea of this model is collaboration between destination management, local communities, and governmental organizations. The conceptual model mixed of existing model initiated by the government and the disaster preparedness village model in both Special Region of Yogyakarta and West Sumatera Province. Beside than building resilient community in facing disaster threat, advantages form economic activity and multi-sectoral synergy is also emphasized. Based on this framework, future researches are projected to analyze the implementation stage of this model or the comparative analysis with other theoretical models.

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